

Strategic Voting under Proportional Representation and Coalition

Governments: A Laboratory Experiment

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Abstract

We investigate whether the theory of strategic voting can explain voting behavior in a fairly common type of political system, multi-party systems with proportional representation, minimum vote thresholds, and coalition governments. In this paper, we develop a formal (computational) *strategic voting game* and show in a simulation that the model produces election scenarios and outcomes with desirable characteristics as well as different opportunities for strategic voting. We then test the decision-theoretic model in a laboratory experiment, taking into account both sophisticated and heuristic decision strategies. Participants with a purely instrumental (financial) motivation voted in a series of 25 independent elections. The availability of polls and coalition signals by parties was manipulated. The results show that voters are frequently able to make optimal or strategic vote decisions, but that voters also rely on simple decision heuristics and are highly susceptible to coalition signals by parties.

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Strategic Voting under Proportional Representation and Coalition Governments: A Laboratory Experiment

Strategic voters face a dilemma in the voting booth. Casting a ballot for the preferred party might be a sincere expression of one's political preference but fail to influence the formation of the next government. The solution in the classic strategic voting scenario—a plurality election in a single member district with three choices—is to vote strategically for the second preference with the better chances (Cox 1997, Fisher 2004). According to the theory of strategic voting, a strategic vote requires an instrumental motivation and is based on rational expectations about the outcome of the next election. By definition, it is insincere.

The strategic voting literature has focused on the influence of different institutional settings and electoral rules on strategic voting. These rules determine not only how voters pick a winning party or candidate in their local electoral district but also whether a party will be represented at the national level, and whether a party will have a mandate (or at least a chance) to form a government after the election. Both theoretical (e.g. Austen-Smith and Banks 1988, Myatt 2007, Fey 1997, Tsebelis 1986) and empirical work (e.g. Abramson et al. 1992, 1995, Alvarez and Nagler 2000, Alvarez, Boehmke, and Nagler 2006, Blais et al. 2001, Irwin and Van Holsteyn 2002, 2003) address these questions. However, the extensive literature on strategic voting has, with few exceptions, ignored a crucial characteristic of parliamentary democracies. Most elections produce legislatures with more than three parties which then have to negotiate coalition governments. With coalition governments, the question of winning and losing not only takes on a different meaning for parties and voters but also requires different strategies than just following the well-known wasted-vote logic in the classic scenario: desert the preferred but hopelessly trailing party for the second choice with the better chances. The wasted-vote logic can still apply in systems using proportional representation, but primarily for small parties threatened by minimum vote thresholds (Gschwend 2007). Among the (multiple) winners are all those parties that become a member of the next coalition government. When casting a ballot, voters support a specific party but exert only indirect control over the formation of a coalition government. However, they do influence whether and how strong a party can participate in these negotiations. Compared to the comparatively easy decision in the classic three-party case, strategic voting in multiparty systems with coalition governments quickly becomes a highly complex and difficult decision task.

The theory of strategic voting assumes that voters cast their ballot in order to maximize their expected utility which depends on their party preferences and expectations about the outcome of the next election (Cox 1997). In a multiparty system, the latter includes not only the expectation of how well the parties will perform in the upcoming election but also which coalitions might be formed after the election. If the theory of strategic voting is correct, voters rise to this challenge and maximize their expected utility by casting *optimal* votes even under these difficult circumstances. It is possible, even likely, that voters use simple heuristics to reduce the complexity of the decision task, for example by paying attention to coalition signals by the parties. The latter can help voters to identify potential coalition governments (Gschwend 2004: 92, Linhart 2007).

This study puts the theory of strategic voting to a test by placing voters in challenging but ideal conditions for strategic voting. These conditions require that voters face decision scenarios which not only provide opportunities for strategic voting (see Alvarez, Boehmke, and Nagler 2006) but allow voters to form rational expectations and to use simple heuristics, for example by providing access to polls and other (more or less) helpful information such as coalition signals.

The vast majority of previous studies about strategic voting at the individual level are based on cross-sectional surveys, conducted before or after single elections (e.g., Abramson et al. 1992, Alvarez and Nagler 2000, Alvarez, Boehmke, and Nagler 2006, Blais et al. 2001, Fisher 2004, Lanoue and Bowler 1992, Niemi, Whitten, and Franklin 1992). Thus, it is very difficult to determine whether and how polls and other information affect the formation of rational expectations and result in vote decisions against the most-preferred party. First, it is more or less impossible to establish causality, particularly when the relationship between political preferences and expectations is not only unclear but possibly reciprocal (Babad 1995, Babad, Hills, and O'Diskroll 1992, Bartels 1988, Blais and Turgeon 2004, Dolan and Holbrook 2001, Gimpel and Harvey 1997, Granberg and Brent 1983, Johnston et al. 1992, Lazarsfeld, Berelson, and Gaudet 1944, Lewis-Beck and Skalaban 1989, Mutz 1998). Second, looking at a single election usually does not provide much variation in the polls or possible coalitions. Consequently, it is not possible to conclude with confidence that a strategic voter would have decided differently if the polls had suggested a different election outcome or parties had offered different coalition signals.

Laboratory experiments are an alternative research design that can establish causality by clearly separating cause and effect. The experimental approach allows a direct test of the theoretical assumptions about conditions and mechanisms of strategic voting. Instead of

recreating a realistic electoral environment in the laboratory that will activate pre-existing political preferences and biases (e.g., Meffert and Gschwend 2007), we chose the format of an economic experiment with theory-based, abstract, and context-free election scenarios. This approach allows the manipulation of contextual and “objective” causal factors for strategic voting such as party positions, party strengths, possible coalitions, and the availability of polls and coalition signals. The impact of these factors and that of simple decision heuristics on strategic voting can be systematically tested with instrumentally motivated voters (operationalized through monetary incentives). In short, the theory of strategic voting is tested in an experiment by observing voter behavior under ideal conditions for strategic decision making.

Experimental Studies of Strategic Voting

Strategic voting behavior has been studied in a variety of economic experiments, testing the impact of different decision rules (Cherry and Kroll 2003, Forsythe et al. 1996, Rapoport, Felsenthal, and Maoz 1991, Yuval and Herne 2005; also: Gerber, Morton, and Rietz 1998), pre-election polls or similar information about preference distributions (Eckel and Holt 1989, Fisher and Myatt 2002, Forsythe et al. 1993, Forsythe et al. 1996, Plott 1991), voting histories (Forsythe et al. 1993, Williams 1991), Duverger’s law (Forsythe et al. 1993, Forsythe et al. 1996), sequential or repeated voting (Eckel and Holt 1989, Morton and Williams 1999, Williams 1991), and coalition governments (McCuen and Morton 2002, Goodin, Güth, and Sausgruber 2008), sometimes framed as a primary or general election and sometimes as a small group or committee decision making task. For the most part, these experiments focus on a very limited set of choices, usually three candidates or parties. These decision scenarios usually have formal solutions and know equilibria that allow a straightforward assessment of optimal decision making. Substantively, these studies have shown that (pre-election) polls are necessary for the formation of rational expectations and the successful coordination of voters (e.g. Forsythe et al. 1993, Forsythe et al. 1996, Plott 1991). The polls used in these studies are not always based on an actual poll of study participants but on the randomly assigned and thus known distribution of voters (e.g. Fisher and Myatt 2002, McCuen and Morton 2002).

Unlike strategic voting experiments in the economic tradition, psychological experiments with realistic decision scenarios based on actual elections are very rare. As far as they exist (e.g. Geer et al. 2004, Meffert and Gschwend 2007), they show at best very weak support for behavior that conforms to the strict assumptions of strategic voting. However, the study by Meffert and Gschwend (2007) suggests that insincere voting is quite frequent in multiparty systems with

proportional representation, with coalition signals by parties as one of the reasons. In other words, some voters appear to be persuaded by strategic campaign information and behave accordingly.

Among the economic experiments, there is virtually no study about elections with more than three choices, electoral rules using proportional representation and minimum vote thresholds, and coalition governments—a typical situation for parliamentary democracies. In an experiment on “tactical coalition voting” (TCV), McCuen and Morton (2002) come closest by addressing several of these aspects. The authors based their experiment on Austen-Smith and Banks’ (1988) formal model of coalition formation under proportional representation, with three parties competing in a one-dimensional space for 23 voters. Parties obtain seats proportional to their votes, but only if they pass a minimum vote threshold. A coalition is always formed by the largest and the smallest party unless a single party has a majority. Participants were randomly placed in the policy space and their payoff was dependent on the location of the new coalition government. The size of the thresholds and the availability of information were manipulated, and participants voted in a series of 20 independent elections. Results show that over two thirds of the participants behaved strategically as predicted by the model, but with a strong tendency to vote sincerely even if a strategic vote was predicted. Access to information was critical to facilitate strategic voting.

TCV is based on an established theoretical model and makes clear predictions. It is essentially a modification of the classic strategic vote decision, a single member district with three choices, in which strategic voters should always vote for the second preference. However, it does not confront participants with decision scenarios that voters face in multi-party systems with multiple coalition options. The rule that the second preference is the optimal strategic choice does not apply anymore, and decisions scenarios are much more complex.

Ironically, Rapoport, Felsenthal, and Maoz (1991) justify imposing considerable restrictions on admissible strategies (when modeling voting behavior) by pointing out that strategic voting requires considerable cognitive resources to perform the calculations necessary for successful decisions. In fact, the decision process might become so demanding that it becomes unreasonable to expect voters to succeed. If true, the theory of strategic voting would not have much to say about the most common political system in Western democracies, hardly a satisfying thought. And even more a reason to test the theory of strategic voting with a model that

captures key components of these systems while not overextending the cognitive capacities of a typical voter.

The Strategic Voting Game Model

Strategic voting in the classic three-candidate case is a comparatively straightforward decision. If the first choice cannot win, voting for the second choice with better chances will (might) produce the best possible outcome. In a multiparty system with proportional representation and coalition governments, the incentives and optimal choices for strategic voting can be quite different. The most obvious incentive for strategic voting is a minimum vote threshold that might prevent small parties from gaining seats, rendering such votes as “wasted” (assuming an instrumental motivation for voting). Even more important is the fact that voters have to consider all possible coalitions after an election, including the strength of the parties that might form a coalition (Linhart 2007). This puts all parties into play, and voting for the second choice is not necessarily the best strategic choice (see also Kedar 2005).

A simple example, extreme but not implausible, can illustrate this point. In a fairly typical multiparty system, elections are often contests between two competing party blocs on the left and the right, each consisting of a major and a small party. A median voter, however, might prefer a grand coalition of the two moderate major parties. One way to reach this goal would be a vote for an extreme party with no prospects of joining a coalition with moderate parties. This would (might) weaken the preferred major parties, but at the same time force them to enter a grand coalition. In short, strategic voting in multiparty systems with coalition governments is not a simple choice between first and second preference but might involve any of the parties, or even strategic abstention. Identifying the optimal vote decision quickly becomes a highly challenging task.

Given the lack of research and/or formal models for electoral systems with more than three parties, electoral thresholds, proportional representation, and coalition governments, a new and different model is required to capture the key components and characteristics of these fairly common political systems. Model building was guided by four key principles or assumptions. First, the party system must include at least four parties to provide multiple, non-trivial opportunities for coalition formation. Second, voters must always know their own policy preferences, the policy positions of the parties, and have a general idea about the strength of the parties (at least whether they are large or small). Knowledge of the precise pre-electoral strength of the parties, however, should depend on access to pertinent information such as polls. Third,

voters must know the precise rules of government formation. A voter familiar with the party positions and access to accurate polls should always be able (in theory) to determine the optimal vote decision. Fourth, voters must have a purely instrumental motivation for decision making, ruling out any expressive motivation. Compared to a sincere vote decision, they must benefit from successful strategic voting but pay a price for failed strategic voting that elects or strengthens less preferred or oppositional parties in government.

Following these guiding principles, our *strategic voting game* model consists of four parties that compete for 15 voters in a two-dimensional policy space. Voters are free to cast a ballot for any of the four parties or to abstain from voting. Parties have to pass a minimum vote threshold (10%, or 2 votes) to obtain seats in parliament. Government formation follows four sequential rules:

- 1) *Absolute Majority*: The party with more than 50% of the seats wins. If no party obtains an absolute majority, the formation of a coalition government with an absolute majority is necessary.
- 2) *Minimum Distance*: If more than one coalition has more than 50% of the seats, the coalition with the (two or three) parties closest to each other wins.
- 3) *Minimum Number of Parties*: If two coalitions have an absolute majority and the same distance, a two-party coalition beats a three-party coalition.
- 4) *Minimum Seat Share*: If two coalitions have an absolute majority, the same distance, and the same number of parties, the coalition with the lower seat share (if more than 50%) wins.

It should be noted that the first two rules are usually sufficient to produce a government. In case all four rules fail to produce a government, the election ends in a stalemate and a new election is called. The exact location of a coalition government in the two-dimensional policy space depends on the strength (number of votes) of the member parties, or in other words, represents the weighted average of the member party locations.

Voters maximize their expected utility if the new government is located as close as possible to their own position. Thus, a voter casts a ballot with the goal of influencing the location of the new government. The success or failure of the vote decision is determined relative to the default decision, a sincere vote for the preferred or closest party. Payoff points are a linear function of the movement of the government in the two-dimensional policy space (with a length and width of 100 units or points). If a voter can move the location of the new government closer

to his or her location (compared to the location of the government if a sincere vote is cast), the reduced distance represents a positive payoff. If, however, a vote for a party other than the preferred party increases the distance between the government and the voter (compared to a sincere vote), the size of the increased distance is the price (in payoff points) the voter has to pay. A sincere vote for the preferred party is always a save choice and results in zero payoff points (with one exception described below).

Depending on the circumstances in a given election, there are up to three mechanisms how a voter might affect government formation. A vote might influence (1) whether a party can pass the minimum vote threshold to gain seats, (2) whether a coalition will reach an absolute majority, and (3) the strength (or weight) of a party in a coalition. A strategic vote might lead to a new or different coalition or merely readjust the weights of the parties within an existing coalition. We distinguish these two decisions as *classic strategic voting* and *strategic coalition voting*.

The locations of parties and voters are randomly generated for each election. For theoretical and practical reasons, the placements of parties and voters in the election scenarios used in the laboratory experiment were subject to three restrictions. First, each voter has only a single preferred or closest party, ruling out ties. Second, there is a minimum distance between each pair of parties (10 units horizontally and vertically), ensuring that all parties and the distances between them are clearly visible in the graphical display of the game space. Third, the strength of each party ranges between one and seven supporters, ruling out that a party has either no support at all (and thus hardly any chance of being represented in parliament), or that it already has an absolute majority from the start.

It should be noted that a small electorate with 15 voters is necessary to create election scenarios in which *individual* votes can make a tangible difference. In real elections, only groups of voters can produce a similar impact. Psychological evidence indeed suggests that voters not only project their own choices on voters with similar preferences (“voter’s illusion”) but also tend to believe that their own vote matters (Acevedo and Krueger 2004). In short, individual voters in our model represent groups of voters that, if they follow a similar decision logic, can produce meaningful electoral shifts.

Before addressing alternative decision strategies and the laboratory experiment in more detail, a simulation will demonstrate key characteristics of the model and decision scenarios.

Simulation

The goal of the simulation is to show what kind of party system and what kind of governments result from the model, including an assessment of the opportunities for strategic voting. The simulation varies two parameters to produce six different scenarios. First, it varies the size of the minimum vote threshold required to obtain seats in parliament from none (equal to a single vote requirement) to 10% (2 votes) and 17.5% (3 votes). Second, the randomly produced election scenarios are either free of any restrictions or subject to the three conditions about minimum party distances and party strength outlined above. For each scenario, the outcomes of 100,000 simulated elections were summarized. Any ties during government formation were broken randomly, and all voters voted sincerely unless indicated otherwise.

The party system produced by the model can be described by showing the average number of parties represented in parliament (Figure 1). According to the model, three to four parties usually have seats in parliament. Only in the scenario with the highest threshold and no restrictions, the model starts to produce a small number of single party systems. In the scenario of interest (with restrictions and a 10% threshold), the number of parties is mostly four (59%), followed by three (39%) and quite rarely by just two parties (2%). In short, this scenario produces the desirable multiparty system in which a single party will often fail the minimum threshold.

[Figure 1 about here]

Government formation can be described by the average number of parties in government (Figure 2). According to the model, two-party coalitions are the most frequent outcome. Only in the extreme scenario with a 17.5%-threshold and no restrictions, single party governments are the most frequent outcome, mostly due to the smaller number of parties represented in parliament. As before, the scenario of interest (with restrictions and a 10%-threshold) produces the most desirable outcomes. Even though two-party coalitions dominate (96%), both three-party coalitions (2%) and single-party governments (2%) are possible.¹

[Figure 2 about here]

So far, the simulation results assume that all voters vote sincerely. The results would obviously change if one (or more) voters would cast a strategic vote. In fact, the most interesting

¹ Given an electorate with 15 sincere voters, a single party government is possible if two parties with a single vote each fail to obtain seats in parliament. One of the remaining parties will have an absolute majority with seven votes, beating the opposition party with just six votes.

question is the extent to which the model produces opportunities for strategic voting. This question can be assessed by determining whether a strategic vote (or strategic abstention) would result in a positive payoff by moving the government closer to the voter. Only one voter is assumed to vote strategically while the other 14 voters behave sincerely. Figure 3 summarizes the results by distinguishing further between *classic strategic voting* (a strategic vote produces a different coalition or government compared to a sincere vote) and *strategic coalition voting* (the vote merely changes the weight of the parties in a given coalition). The results show that there are many more opportunities for strategic coalition voting than classic strategic voting, but that a higher minimum vote threshold increases the latter while decreasing the former. This can be explained by the fact that more parties are affected by a higher threshold, because it produces a smaller party system. As a result, the number of single-party governments increases. In the scenario of interest, nearly every second election provides an opportunity for strategic voting, whether classic strategic voting (14%) or strategic coalition voting (33%).

[Figure 3 about here]

In summary, our model produces a party system and coalition governments that not only have the desired properties but also provide plenty of opportunities for strategic voting. The election scenarios used in the experiment below are drawn from the reference category with restrictions in place and a 10% minimum vote threshold.

Sophisticated vs. Heuristic Decision Making

According to the theory of strategic voting, voters have the single-minded instrumental goal of maximizing their expected utility. This assumes and requires a sophisticated and elaborate decision making process. Voters have to know and use information about parties' policy positions and their expected electoral strengths to determine the optimal vote decision. Previous studies, whether survey-based or experimental, show that the number of voters who appear to vote strategically is rather small (e.g. Fisher 2004, Meffert and Gschwend 2007; but see also: Alvarez, Boehmke, and Nagler 2006). In addition, the mere observation of a strategic vote is not necessarily evidence that a voter did engage in a sophisticated decision process. The theory of strategic voting defines strategic voters only *post hoc* by the electoral decision for a less preferred party, not *a priori* by the decision making process—which most of the time might very well lead to the conclusion that a vote for the preferred party is optimal. Apparently strategic voting behavior might also have much simpler explanations. Contextual cues such as coalition signals sent out by parties could facilitate or induce strategic voting, or voters might rely on simple

heuristics such as avoiding weak, isolated, or distant parties that, all else being equal, will *usually* not play a decisive role in government formation. Sophisticated and heuristic decision modes do not necessarily exclude each other. In fact, the latter might even help to reduce the complexity of the decision task to likely solutions, but the former mode will be necessary to detect and override any misleading cues or shortcuts. In short, both types of decision making have to be considered when analyzing strategic voting in complex election scenarios.

Coalition Signals

In multiparty systems with coalition governments, parties usually make announcements about potential and possible coalitions after the next election. These announcements might range from an ambiguous “no comment” to explicit statements in favor or against specific coalitions. These statements signal intentions but lack certainty because only the election result will determine with certainty whether specific coalitions are possible. One particular type of (positive) coalition signal is of primary interest here because it explicitly appeals to voters to cast a strategic vote. For example, German coalition governments usually include a major and a small party, with the latter occasionally threatened by the minimum vote threshold. When that happens, the parties often appeal to supporters of the strong and secure major party to cast a “rental vote” (*Leihstimme*) in favor of the small party, securing not only parliamentary seats for the junior coalition partner but a majority for the coalition itself. Survey (Gschwend 2007, Pappi and Thurner 2002) and experimental (Meffert and Gschwend 2007) evidence suggests that voters follow these appeals even if polls and/or voter expectations do not suggest that such behavior is necessary.

As a consequence, it is reasonable to expect that voters take note and sometimes follow such positive coalition signals. If such a signal covers the (from the perspective of the voter) optimal government coalition, merely following the coalition signal can be *sufficient* to cast a successful strategic vote. If a signal points in the wrong direction, however, blindly following this misleading cue might lead to suboptimal or even very *harmful* vote decisions.

Simple Heuristics

Strategic voters might also rely on simple contextual cues. Given the basic motivation to avoid casting a wasted vote, voters might quickly eliminate parties from further consideration that have presumably disqualifying characteristics, either because they will not affect government formation at all or, even worse, increase the likelihood of a harmful (more distant) government.

Three such simple decision rules will be considered, each of them supported by simulation results:

1) *Avoid distant parties*: As the distance of a party from the voter increases, the likelihood of a positive payoff from casting a strategic vote for that party decreases while the likelihood of a negative payoff increases. The simulation reported above supports this contention. The closest party is most often the optimal decision (52.8%), followed by the second (28.1%), the third (15.1%), and the most distant party (2.1%).²

2) *Avoid isolated parties*: A party that is isolated (relatively and visibly more distant) from the other parties is less likely to play any role in government formation. Formally, a party is defined as isolated if the sum of the distances to the other three parties is at least 20% larger than the (second highest) sum of distances of the next party. According to the simulation, isolated parties are only optimal in 4.4% of the scenarios overall, or in 11.3% of the elections when limited to the 38.9% of election scenarios which include an isolated party.

3) *Avoid small parties*: Small parties are less likely to play a decisive role in government formation, in particular because they might fail to pass the minimum vote threshold. According to the simulation, very small parties (with two or fewer supporters) are the optimal vote decision in only 14.2% of the election scenarios overall, or 16.6% of the elections when limited to the 85.4% of election scenarios which include small parties.

Our simulation results illustrate that each of these three decision rules can be useful to reduce the complexity of the decision task, but neither is necessarily correct. In the following experiment, we test whether voters (can) use sophisticated and heuristic decision strategies in a game-based parliamentary democracy with proportional representation and coalition governments.

Laboratory Experiment

Election Scenarios

Participants voted in a series of 25 independent elections. These election scenarios were drawn from a pool of potentially interesting elections, generated randomly with the restrictions described above. The pool of elections was narrowed down using three selection criteria: the difficulty of the elections (see below), the size of the payoffs (maximum gain or loss not

² The percentages are based on the simulation for the reference category with restrictions and a 10% threshold. In 1.9% of the election scenarios, strategic abstention is the only optimal choice.

exceeding 10 payoff points), and the type of decision necessary to obtain the maximum payoff (a classic strategic vote that produces a new/different coalition, a strategic coalition vote that changes the strength of the parties in an existing coalition, or a sincere vote for the preferred party). All participants voted in the same 25 election scenarios, but in a randomized order.

Manipulation of Polls and Coalition Signals

To investigate the impact of polls and coalition signals, the availability of these two critical information sources for strategic voting was manipulated. Polls were generated automatically based on the actual distribution of party preferences of the voters instead of conducting polls of the participants. Due to the applied restrictions, each party had between one and seven supporters. If poll information was available, voters saw the number and percentage of supporters for each party on the screen. However, even if the poll was not visible, participants were informed whether each party was a *major* party supported by more than 25% of the voters or a *small* party supported by less than 25% of the voters. Thus, voters would know with certainty that two large parties would always have an absolute majority of seats while two small parties would not be able to reach a majority (assuming sincere voting). Given the critical importance of polls for optimal vote decisions, the availability of polls was randomly assigned with a disproportionate probability (80% visible, 20% hidden), independently for each election round.

Coalition signals, on the other hand, constitute supplementary information that may help to identify the next governing coalition but that can never guarantee that this particular coalition will have a majority after the election. Even if not successful, coalition signals have to be at least plausible to be seen as credible and taken seriously by participants. As a consequence, a random generation of coalition signals is not possible because it might lead to rather absurd signals, for example between the two most distant parties or between two small parties. Instead, coalition signals were produced by a simple decision rule. A signal always includes the two parties that are closest to each other, with at least one major party among them. In other words, the coalition signal represents a simple heuristic to identify a potential governing coalition. In “easy” elections, this simple heuristic will identify the optimal government for the voter. In “difficult” elections, this signal will not show the optimal government. Note that the signal is based on the location (or distances) and general strength of the parties, information that is always available to voters, even without a poll. Also note that while the signal might show the optimal government that will be formed, it does not necessarily include the optimal party choice of a voter. Because the coalition

signal is not necessary for an optimal decision, the availability of coalition signals was assigned with even probability (50% visible, 50% hidden), again independently for each election round.

Participants

Participants for the experiment were recruited by email from the participant pool of the experimental lab of the Collaborative Research Center (SFB 504) at the University of Mannheim, Germany. The average age of the 279 participants was 24, ranging from 17 to 47 years, 62.4% were male, and most were students enrolled in a variety of majors, but most frequently in business or economics.

Procedure

At the beginning of each session, participants were seated at separate computer terminals and given a short verbal introduction, announcing that each participant would play with (or against) simulated voters and how payoff points would be converted in a cash payoff at the end. The study continued on the computer and participants were able to proceed at their own pace.

Participants first responded to a short version of the Need for Cognition Scale (Cacioppo and Petty 1982; agreement with 12 items about problem solving; $\alpha = .79$) before they read a detailed explanation and instructions for the voting game, including a step-by-step explanation of all elements of the game screen (Figure 4). Before the game began, they had to pass a quiz testing knowledge and understanding of the rules of government formation or were returned to the beginning of the instructions. After passing the test, participants completed nine trial elections. After each trial election, participants could modify their vote to observe the effects of different decisions, view a list of the optimal choice(s), and read a short explanation of the optimal choice(s). In the subsequent 25 competitive elections, participants played for payoff points. They had 90 seconds to cast a vote in each election, and a failure to vote in time was counted as abstention. The “voting booth” opened after a short 5-second delay and showed a countdown for the last 10 seconds. Participants always saw their own location and the location of the four parties in the graphical display of the two-dimensional policy space. The preferred (closest) party was listed below the policy space as a reminder. While the status as major or small party was always visible, the availability of polls and coalition signals was randomized as described above.

[Figure 4 about here]

Participants had access to two optional information tools. One showed the exact (numerical) pairwise “party distances” and was helpful if the distances were hard to determine based on the graphical display. With the “distance calculator,” participants could obtain precise

information about the distances between their own location and possible government locations (individual parties or coalitions without any weighting for party strength). For coalitions, the calculator also showed the estimated intra-coalition distances, which are of interest primarily for three-party coalitions.

Each election ended with the vote decision (or after 90 seconds) and participants saw the results of the election, including vote and seat shares for each party, the new government (which was also shown in the policy space), their vote decision, the payoff points earned or lost in the election, and the cumulative payoff points over all completed elections. On average, decisions required 30.7 seconds ($SD=19.3$, $Median=26$), and only 24 out of 6975 decisions (.3%) were not made in time.

Participants earned or lost payoff points depending on their success of moving the government closer to or away from their own position, relative to the government position after a sincere vote. The possible gains ranged from .05 to 9.87 payoff points in different games, the losses ranged between -.04 and -8.31 points. In five elections, a sincere vote was also the optimal choice (with no positive payoff possible). For every optimal decision, participants received an additional bonus point that was added to the cumulative payoff points. The bonus points had two functions. They provided a positive payoff in the five elections in which the sincere vote was also the optimal vote, with no other opportunity to obtain a positive payoff. Second, by flagging optimal decisions, the bonus points also provided participants with limited feedback about their performance.

Participants started with an initial endowment of 12 payoff points. At the end of the study, the payoff points were converted into a cash payout in Euro (1 payoff point = 25 Cents).³ A minimum payoff of €3 was guaranteed for completing the 25 elections and answering a short questionnaire. The average payoff was €9.55 (about \$13).

After voting in all 25 elections, participants answered two open-ended questions about their decision strategy and the usefulness of the graphical display, polls, and coalition signals. After a few demographic questions, participants responded to an open-ended 13-item political knowledge scale (Zaller 1992), asking about the jobs of various public officials (or vice versa)

³ The payoff function (initial endowment and conversion rate) was slightly modified for two small groups of participants, without affecting their voting behavior. Consequently, all groups were combined for the analyses.

and some questions about the political system ($\alpha = .81$). Participants were thanked for their participation, debriefed, and collected their payoff upon leaving the lab. Participation in the computer-based part of the study took on average 52 minutes.

Results

Optimal Voting Performance over Time

Starting with an overall aggregate assessment of participants' performance over time, the share of optimal decisions increased only marginally from about 46 percent to 49 percent, or about half of the vote decisions (Figure 5). The learning effect is, as far as it exists, rather small. At the same time, however, the share of sincere preference votes declined significantly to 35% from 44%. Participants appear to have gained more confidence with repeated voting and increasingly attempted to vote strategically, but with limited success. Finally, the average decision time also dropped significantly from 34 to 27 seconds. This also suggests that participants were increasingly confident in their own decision making ability (though weariness and impatience might have played a role as well toward the end of 25 election rounds). In short, as participants gained experience and confidence, their overall ability to make optimal decisions increased only slightly to about half of the decisions.

[Figure 5 about here]

Voting Performance by Difficulty and Information Sources

A more detailed assessment of the voting performance including the impact of polls and coalition signals requires a differentiation according to the difficulty of the decision scenarios. Easy elections were associated with optimal coalition signals, or in other words, the question of government formation could be solved with an easy heuristic. Difficult elections were associated with suboptimal or misleading signals, that is, the question of government formation was less obvious and required a more careful assessment of the scenario. In order to assess the separate and combined effects of polls and coalition signals on optimal decisions, vote decisions were classified by the kind of information available to participants in a given election—none, polls only, coalition signal only, or polls and coalition signals combined.

As expected, voters were much more successful casting optimal ballots in easy elections than in difficult elections (Figure 6 and Table 1). With all information available (polls and coalition signals), the share of optimal decisions reached 67.7% in easy and 37.6% in difficult elections. In easy elections, even voters with no access to information made optimal decisions at a rate of 51.7%. Access to polls or optimal coalition signals increased the success rate by more

than 10 percentage points to 64.2% and 64.8%, respectively. With both types of complementing information available, the success rate increased slightly further to 67.7%. The equivalent effects of polls and signals are remarkable. Whether using polls to actively determine possible governments or by merely following the coalition signal, voters were able to significantly increase the chance of casting an optimal vote.

[Figure 6 about here]

[Table 1 about here]

Difficult elections posed a bigger challenge. Without any information, optimal ballots were cast with a success rate of only 30.9%, not much better than chance. Access to polls and suboptimal coalition signals had the expected opposite effects. As before, access to polls increased the success rate by about 10 percentage points to 40.8%. With only a suboptimal or misleading coalition signal available, the success rate dropped to a low of 21.8%. With both types of—in this case contradictory—information available, voters apparently gained the ability to discount the misleading signals and rather use the polls to reach a success rate of 37.6%.

Voters were fairly successful at avoiding unquestionably wrong voting decisions that caused a loss of payoff points. Even under the most difficult circumstances—difficult elections with a misleading coalition signal but no poll information—only 22.7% of the decisions were unequivocally wrong.

The evidence so far allows the following conclusions. First, polls appear to be a consistently helpful source of information for strategic voting. A lot of voters are able, even in difficult situations, to use poll information to make optimal vote decisions, or at least to avoid bad ones. Second, voters appear to be very receptive to coalition signals. As long as these signals provide accurate information, the heuristic of following this cue can successfully substitute for polls. In fact, polls are not even necessary in this case. However, if coalition signals lead in the wrong direction, this heuristic causes bad decisions. Strategic voters cannot rely on coalition signals alone. Finally, access to polls allowed voters to discount and counterargue misleading coalition signals. In summary, polls are a consistently helpful source of information for strategic voting while coalition signals can be sufficient under optimal circumstances but very harmful at other times.

Overall, strategic voting had a high success rate in elections with fairly transparent decision scenarios. But once the question of government formation became more complicated, strategic voting became a challenging task with a rather low success rate as well.

Decision Making at the Individual Level

Turning to individual voting decisions, the voting behavior of the participants was assessed in two ways, first by considering all choice options simultaneously and then by focusing on optimal vote decisions.

Participants had five choices in each of the 25 elections, four parties and the option to abstain. Only one choice was optimal in most election scenarios. In two election scenarios, two choices were optimal and produced the same optimal government or maximum payoff. In total, participants faced 125 choice options, 22.4% with a positive payoff, 35.2% with a negative payoff, and 42.4% with no effect at all on payoffs.⁴

Assuming identical decision behavior across all participants, vote decisions can only be based on choice-specific attributes. With one exception, the relevant predictors were operationalized with dichotomous indicators and tested with a conditional logit regression model. *Preferred* and *optimal* choice(s) are two self-explanatory indicators of the preferred party and the optimal choice(s) in a given election scenario. The impact of the latter is assumed to represent the outcome of a sophisticated, strategic decision process. The *signal* indicates that a party was named in the coalition signal and that the coalition signal was visible in a given election round. Three additional predictors represent the three simple heuristics discussed above. *Distance* indicates the relative distance of the non-preferred parties from the voter, above and beyond the distance of the preferred party (preferred party and abstention are set to zero). *Isolated* party indicates that a given party is relatively isolated (as defined above) from the other three parties. A *small* party indicates a party that had the support of two or fewer voters in the polls, or if no poll was visible, that was labeled as a “small” party. Because the election scenarios and the location of the parties were randomly generated, the effects are expected to be equal across all parties. To account for any potential choice-specific differences, four choice- or party-specific constants were included, using abstention as the baseline category. Because the visibility of polls is constant across choice-sets, a poll indicator is not directly included in the model. Instead, four separate models are estimated for easy and difficult elections, with polls either visible or not

⁴ If bonus points for optimal preference votes (with a zero payoff otherwise) are included as well, the share of choice options with a positive payoff increases to 27.2% while choice options without any effect on payoffs declines to 37.6%.

shown. The standard errors account for the clustering in the data (a cluster represents the 125 choice options faced by each participant).

The results show, and strongly confirm, that party preference, represented both by party distance and preferred party, played a decisive role in the elections. The relative distance measure is consistently significant in all four models. The larger the relative distance of non-preferred parties, the less likely they were chosen. With each point that the distance of a non-preferred party increases, the odds of choosing this party decreased by a factor between .94 (6%) and .96 (4%), holding the values of the other alternatives constant (Table 2). The preferred party became a significant fallback option only for difficult elections. Without access to polls, voters were twice as likely to choose the preferred party. With polls, the odds of choosing the preferred party still increased by 16%.

[Table 2 about here]

The coalition signal was, next to the distance heuristic, the only other factor consistently significant for all election types. In particular without poll information, the odds of choosing a party in the signal more than doubled (2.72 for easy elections and 2.38 for difficult elections). Access to polls decreased the impact of coalition signals, but the odds for a party in the signal still doubled in easy elections and increased by 34% in difficult elections. Coalition signals by parties seem to be able to effectively cue and coordinate voters' decision making.

Voters were fairly successful in identifying optimal choices in all elections types, in particular if polls were available. Even without polls, the odds of selecting an optimal choice increased by 70% for easy elections and 44% for difficult elections. This suggests that participants were able, even without poll information, to make educated guesses about optimal choices. With polls available, the odds of an optimal choice more than tripled in easy elections and more than doubled in difficult elections. These effects confirm that poll information is crucial for successful strategic voting.

The two other heuristics also confirm the expected effects. The heuristic of avoiding isolated parties was significant in three of the four models, reducing the odds of an isolated party between 46% and 70%. Small parties were avoided if they were clearly identifiable as such in polls, but not if they were only known or labeled as small without access to more precise polls. In easy and difficult elections, the odds of a small party decreased by 51%. Voters apparently used both heuristics to reduce the complexity of the decision task. Finally, the party-specific constants confirm that there were no systematic differences between the four party choices.

The vote choice model suggests that participants were able to engage in sophisticated decision making, though the success rate depended considerably on contextual factors such as polls and the quality of the coalition signal. This leaves the question whether all voters have the same ability to make optimal decisions, or whether individual differences—individual capabilities, knowledge, and behavior—play a role as well. To answer this question, the analysis shifts the focus from choice-specific explanations to voter-specific explanations and investigates the factors that facilitate optimal vote decisions. In the new model, the dichotomous dependent variable simply indicates whether or not a vote decision was optimal. The independent variables include three scenario-specific manipulations, the availability of *polls* and coalition *signals* as well as the election *round*. The latter represents the potential learning effect over time. The remaining six independent variables represent voter-specific attributes and behaviors. These include the *decision time* in seconds, the use of the two optional information tools (*distance calculator* and *party distance matrix*), the need-for-cognition (*NFC*) and political *knowledge* scores, and male *sex* of the voter. With the exception of sex, higher scores on these variables were expected to increase the likelihood of an optimal vote decision, either because they provide more opportunities and information for an optimal decision or because voters had better cognitive capacities for sophisticated decision making. The model was estimated separately for easy and difficult elections, and the standard errors account for the clustering in the data.

The results confirm once more that poll information was crucial for making optimal decisions, improving the odds of optimal decisions by 37% for easy and 65% for difficult elections (Table 3). The coalition signal was also significant, but with opposite effects depending on the election type. Optimal signals in easy elections had a substantial positive impact (28%) while suboptimal signals in difficult elections lowered the odds of optimal decisions by 15%. Voters also showed a learning effect, but only for difficult elections. The odds of an optimal decision increased by one percent with each additional election round. For easy elections, no learning effect was found.

[Table 3 about here]

Among the voter-specific variables, decision time showed a similar conditional effect. Taking more time to cast a vote in difficult elections improved the odds of optimal decisions by one percent for each additional second, again with no beneficial effect for easy elections. The use of the two optional information tools showed differential effects. The use of the party distance matrix—indicating a careful assessment of information was critical for government formation—

showed similar significant positive effects for easy and difficult elections. The use of the distance calculator tool, however, had no or, in the case of easy elections, a significant negative impact. It is highly unlikely that the latter effect indicates a causal relationship. It can rather be seen as a symptom of failing to solve the comparatively easy government formation task.

The effects of the remaining three variables suggest that individual differences play a role in strategic voting, confirming similar findings for survey data (Gschwend 2007). Voters scoring higher on the NFC scale were more successful in making optimal decisions in difficult elections, increasing the odds by 17% for each additional scale point. Political knowledge, on the other hand, gave an edge in easy elections, increasing the odds of optimal decisions by 4% for each scale point. Rather surprisingly, male voters were more likely to cast optimal votes in easy elections (26%), with no remarkable sex differences in difficult elections.

Discussion and Conclusion

The theory of strategic voting was tested at the micro-level and for a fairly common type of political system that is more or less absent in the pertinent experimental literature: multi-party systems with coalition governments and electoral rules that include proportional representation and minimum vote thresholds. With the notable exception of McCuen and Morton (2002), hardly any research has attempted to put the theory to a rigorous empirical and experimental test with all the noted conditions present. Our study demonstrates that this is not only possible, but that voters are frequently able to make strategic vote decisions even under fairly difficult conditions. Our study has five key findings.

- (1) The simulation shows that the *strategic voting game* model produces plausible party systems and coalition governments. With a few restrictions applied to party positions and voter preferences, the model shows that classic strategic voting or strategic coalition voting lead to positive payoffs in nearly half of the randomly produced election scenarios.
- (2) In the laboratory experiment, voters were able to make optimal vote decisions in nearly half of the elections, though the success rate depended considerably on the difficulty of the election scenario and the availability of helpful information.
- (3) Polls are a crucial information source and essential for the formation of rational expectations. Access to polls always facilitates better (more optimal) decisions. The effect of coalition signals, on the other hand, depends on their usefulness—something a voter cannot know in advance. Optimal coalition signals help and in fact can substitute for polls, while suboptimal signals make

optimal decisions more difficult. Only access to polls can prevent the negative impact of misleading coalition signals.

(4) Strategic voters seem to rely on a number of heuristics to reduce the complexity of the decision task. Most of the time, the use of heuristics makes sense, but they cannot guarantee optimal decisions. Before casting a strategic vote, a sophisticated voter will always have to confirm the choice with poll-based information.

(5) Individual differences matter. Because strategic voting is a challenging task, cognitive skills such as a (high) need-for-cognition or a (high) degree of political knowledge facilitate decision making and tend to increase the likelihood of optimal decisions. In addition, voters have to invest more time to make optimal decisions under difficult circumstances.

The study has a number of implications. The consistent and strong impact of coalition signals suggests that the issue of coalition governments needs further attention. There is not much research on the impact of voters' coalition preferences on voting behavior in general (e.g. Aldrich et al. 2004, Bargsted and Kedar 2007, Blais et al. 2006), and virtually no research on the impact of different types and kinds of coalition signals. Both factors might have considerable explanatory power, whether for strategic voting behavior (to maximize expected utility) or because genuine coalition preferences trump party preferences and lead voters to cast an “insincere” vote, no matter what the polls say.

Voters are cognitive misers and will always try to make cognitively efficient decisions (Fiske and Taylor 1991). There is no reason to expect that strategic voters are fundamentally different. The use of heuristics makes sense even for strategic voters if it simplifies the decision task, but only if they are used with care and confirmed with better information. In short, sophisticated and heuristic decision making can complement each other.

The generalizability of a laboratory experiment with artificial decision scenarios and student participants has limits. First, participants in the study did not have strong or fundamental party preferences that frequently guide voting behavior in real elections. Without strong party preferences, strategic voting becomes “easier.” While undoubtedly true, two aspects should compensate for this shortcoming. First, strategic voters by definition should only have an instrumental motivation to affect the formation of the next government. Whether that involves voting for the preferred party or some other party should not matter. Second, the strong effect of the party distance heuristic (see Table 2) clearly demonstrates that proximity matters and works against more distant and less preferred parties. Participants had to pay a real price—figuratively

and literally speaking—for wrong decisions. In short, the distances in the *strategic voting game* can be seen as functionally equivalent to party and policy preferences in real elections.

With mostly student participants, the voters in our study are not representative of the general population and likely better able to respond to complex decision tasks. But because the decision task requires and depends on cognitive skills as opposed to factors related to the social and demographic background of voters, it is highly unlikely that our student participants make decisions that are systematically different from the general population. It would obviously be desirable to replicate the study with a representative sample.

A third limit is the artificial construction of the decision task. In real elections, voters are usually familiar with the parties and possible coalitions, and they will often be able to use experience and additional heuristics to simplify the decision task. For example, even with more than four parties running in an election, voters will often identify, with the help of media reports and statements by politicians and parties, plausible coalitions based on ideological blocks, dramatically reducing the complexity of the decision task.

The study does not and cannot say anything about a prominent question in the previous literature on strategic voting, the number of strategic voters in an election. The purpose of this study was rather to test whether voters are *able* to make optimal vote decisions under *ideal conditions for strategic voting*. By design, participants had an exclusively instrumental (financial) motivation to vote and faced election scenarios that, for the most part, required strategic voting to obtain the highest payoff. Our study shows that nearly half of the decisions were optimal and only less than a fifth of the decisions wrong and costly. The theory of strategic voting clearly has something to say about multi-party systems with proportional representation and coalition governments, even if a formal model is so far elusive.

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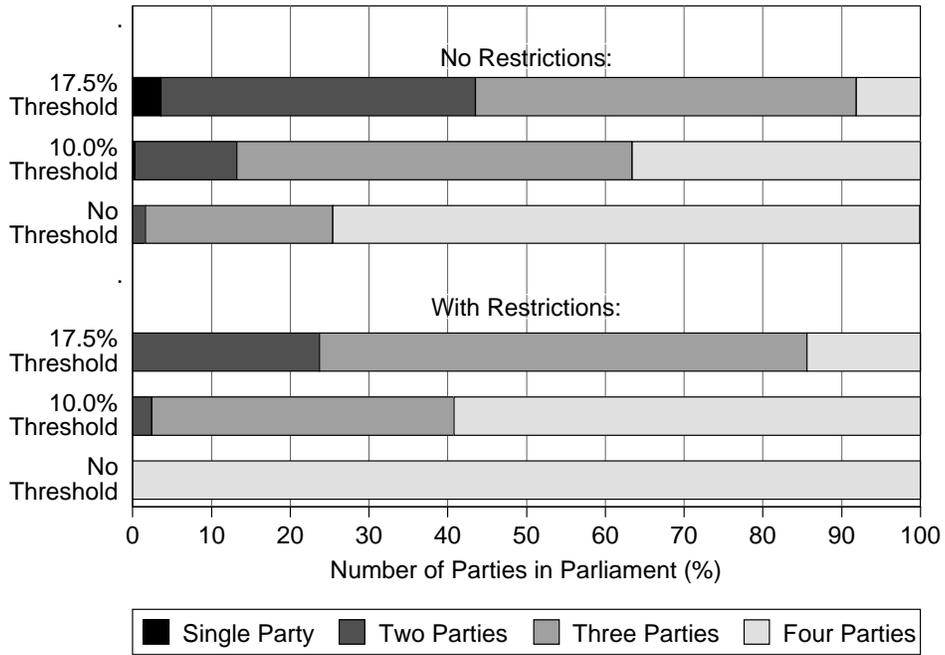
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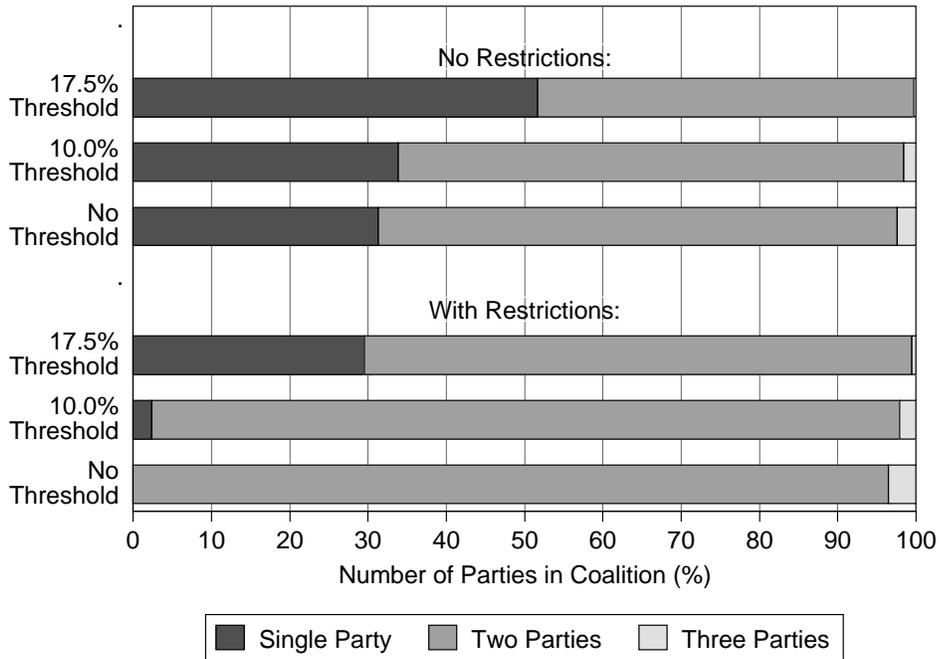
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Figure 1: Simulated Number of Parties in Parliament



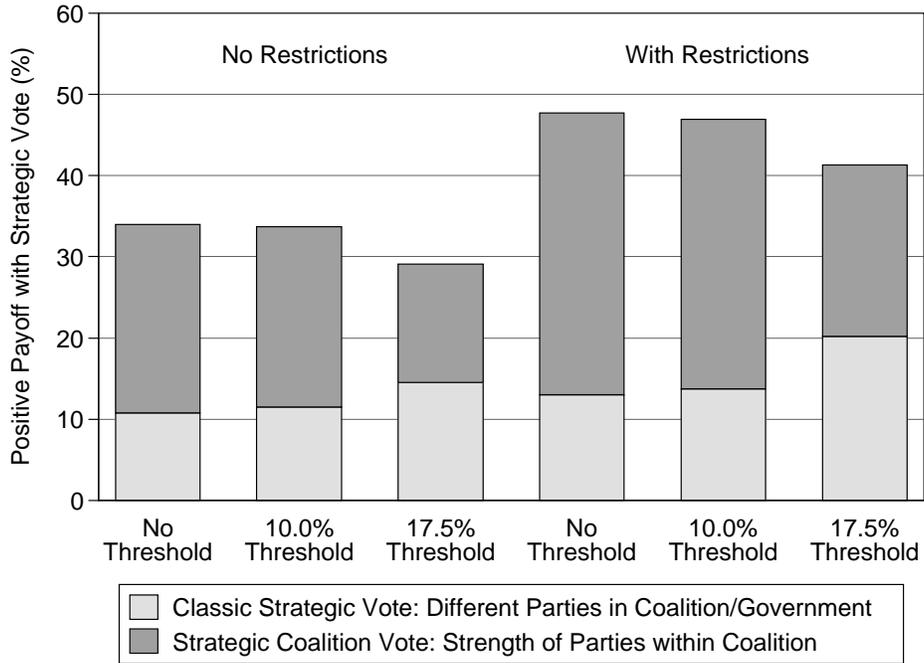
Note: Each entry (bar) is based on 100,000 simulation rounds.

Figure 2: Simulated Number of Parties in Government



Note: Each entry (bar) is based on 100,000 simulation rounds.

Figure 3: Positive Payoff with Strategic Vote (Simulation)



Note: Each entry (bar) is based on 100,000 simulation rounds.

Figure 4: Screenshot of Game

Voting Game - Game in Session

Poll:	A (Small Party)	3	(20%)
	B (Major Party)	4	(27%)
	C (Major Party)	5	(33%)
	D (Small Party)	3	(20%)

Round 1 / 25

Coalition Signal: B and D

Preferred Party: A

Info Tools

Distance Calculator

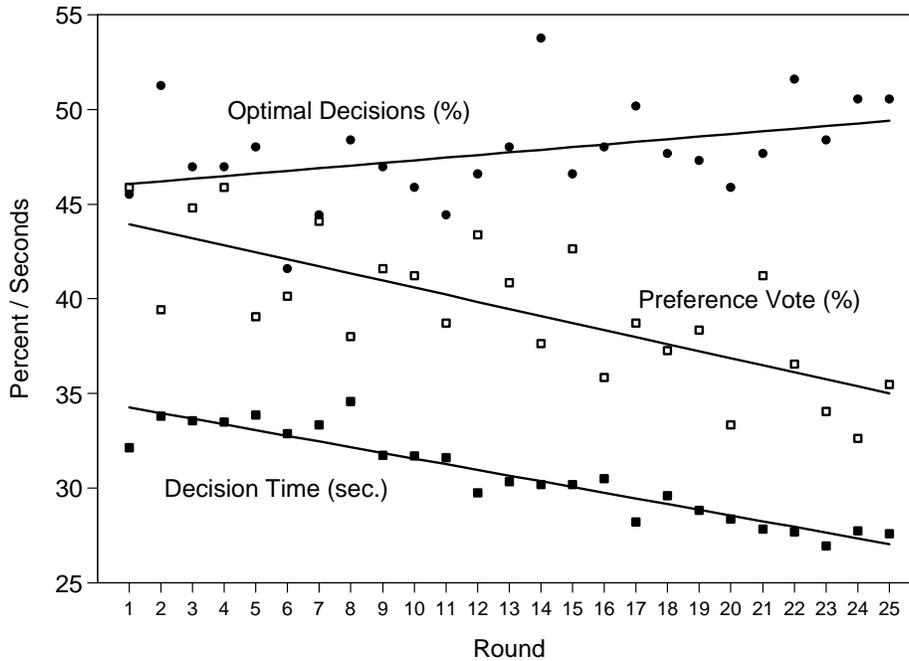
Party Distances

Voting Booth opening soon

A
B
C
D

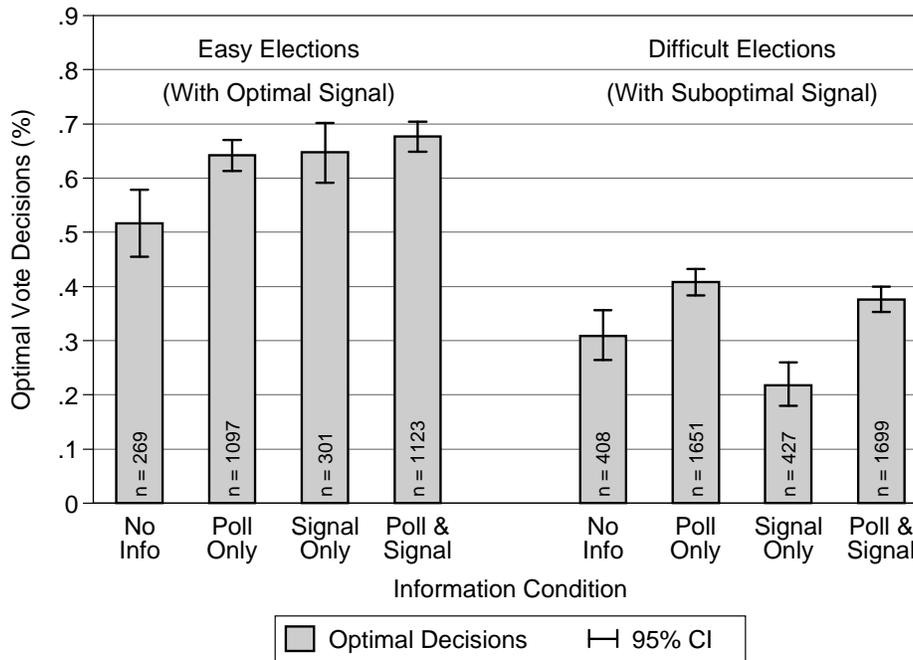
Abstain

Figure 5: Optimal Decisions, Preference Votes, and Decision Time over Time



Note: Markers represent percentages or averages for each round. Lines represent the linear trend for each series.

Figure 6: Optimal Decisions by Difficulty and Information Sources



Note: Bars represent percentages. Due to the random but disproportionate assignment of the poll manipulation (independently for each election), the number of participants and vote decisions differ for the four models for each election type. Not all participants are represented in all four categories.

Table 1: Classification of Vote Decisions by Coalition Signals and Poll Information

	Easy Elections (With Optimal Signal)				Difficult Elections (With Suboptimal Signal)			
	No Info	Poll Only	Signal Only	All Info	No Info	Poll Only	Signal Only	All Info
Optimal	51.7	64.2	64.8	67.7	30.9	40.8	21.8	37.6
Sincere	39.8	32.3	35.6	34.0	53.9	38.3	52.5	42.8
Insincere								
- Gain (strategic)	42.8	52.3	51.8	52.8	19.6	32.8	12.9	28.8
- No effect	4.5	3.7	3.3	2.2	12.3	7.3	11.9	8.5
- Loss	13.0	11.8	9.3	11.0	14.2	21.6	22.7	19.9
N	269	1097	301	1123	408	1651	427	1699

Note: Entries are column percentages. Due to the random but disproportionate assignment of the poll manipulation (independently for each election), the number of participants and vote decisions differ for the four models for each election type. Not all participants are represented in all four categories.

Table 2: Vote Decisions by Difficulty and Poll Information

	Easy Elections (With Optimal Signal)				Difficult Elections (With Suboptimal Signal)			
	No Poll		With Poll		No Poll		With Poll	
	B (RSE)	Odds Ratio	B (RSE)	Odds Ratio	B (RSE)	Odds Ratio	B (RSE)	Odds Ratio
<i>Attributes</i>								
Optimal	.529*** (.142)	1.70	1.107*** (.080)	3.03	.365*** (.103)	1.44	.805*** (.048)	2.24
Signal	1.002*** (.201)	2.72	.696*** (.104)	2.00	.865*** (.155)	2.38	.290*** (.063)	1.34
Preferred	-.392 (.208)	.68	-.125 (.118)	.88	.692*** (.136)	2.00	.147* (.067)	1.16
Distance	-.062*** (.008)	.94	-.035*** (.004)	.97	-.038*** (.004)	.96	-.027*** (.002)	.97
Isolated	-.175 (.420)	.84	-.618** (.205)	.54	-1.196*** (.211)	.30	-.901*** (.085)	.41
Small	-.251* (.118)	.78	-.709*** (.080)	.49	.070 (.102)	1.07	-.721*** (.059)	.49
<i>Constants</i>								
Party A	2.525*** (.335)		2.636*** (.221)		2.679*** (.307)		3.155*** (.167)	
Party B	3.166*** (.395)		2.997*** (.235)		1.926*** (.331)		3.255*** (.163)	
Party C	2.994*** (.377)		2.949*** (.246)		2.537*** (.326)		3.352*** (.166)	
Party D	2.367*** (.389)		2.135*** (.239)		2.503*** (.332)		3.216*** (.173)	
χ^2	371.73		1175.70		360.97		1225.43	
Cluster	259		279		268		279	
N	2850		11100		4175		16750	

Note: Entries are conditional logit coefficients, robust standard errors in parentheses, and odds ratios. A cluster consists of all 125 choice options faced by each voter (25 elections, with 5 choices each). Due to the random but disproportionate assignment of the poll manipulation (independently for each election), the number of participants and vote decisions differ for the four models. Not all participants are represented in all four models.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3: Optimal Decisions

	Easy Elections (With Optimal Signal)		Difficult Elections (With Suboptimal Signal)	
	B (RSE)	Odds Ratio	B (RSE)	Odds Ratio
Poll	.312** (.095)	1.37	.503*** (.096)	1.65
Signal	.249** (.086)	1.28	-.164* (.067)	.85
Round (1-25)	.000 (.006)	1.00	.009* (.004)	1.01
Decision Time (5-90)	.000 (.003)	1.00	.008*** (.002)	1.01
Tool Calculator	-.590*** (.117)	.55	.070 (.098)	1.07
Tool Party Matrix	.261* (.105)	1.30	.174* (.083)	1.19
NFC (0-4)	.169 (.118)	1.18	.154* (.072)	1.17
Knowledge (0-13)	.043* (.018)	1.04	.020 (.012)	1.02
Sex (male)	.228* (.105)	1.26	.107 (.079)	1.11
Constant	-.585 (.354)		-1.951*** (.234)	
χ^2	80.22		112.50	
Cluster	279		279	
N	2790		4185	

Note: Entries are logistic regression coefficients, robust standard errors in parentheses, and odds ratios. A cluster consists of all 25 vote decisions made by each voter.

* $p < .05$, ** $p < .01$, *** $p < .001$